Attachment 2: Life Cycle Assessment of Organic Diversion Alternatives and Economic Analysis of Greenhouse Gas Reduction Options

April 2010 PROJECT STAFF EVALUATION MATRIX of Draft Final Report & GHG Tool

http://www.calrecycle.ca.gov/Climate/Organics/LifeCycle/

Observations related to Policy issues				
Observations related to Economic Analysis				
Observations related to technical issues and/or GHG's				
Line	**Staff/Stakeholder Observations**	**PAGE/ LOCATION**	**Contractor Response**	**Potential Work Needed (pending funding & resources)**
1	The 81% landfill gas collection efficiency rate "unjustifiable". Also, using "instantaneous" collection efficiencies is incorrect, one should use life cycle based collection efficiencies.		RTI: Landfill gas collection efficiency is difficult to get agreement on. We used a combination of data provided by CA facilities and EPA AP-42 to derive an estimate. The efficiency can be changed in the tool as desired.	If future funding is allocated, conduct additional research on collection efficiency. Rely on user to adjust efficiency in tool as desired.
2	Transportation distances appear "arbitrary".		RTI: In effect they are rather arbitrary because forecasting where facilities might be located in the future is difficult. Where we had good information for major planned facilities, such as Mesquite LF, we used it. For the rest we just had to assume something that was reasonable.	Forecasting was not included in the project; expand the scope in a future project.
3	GHG benefits of compost application do not appear to include the avoided transportation and manufacturing of synthetic fertilizers and pesticides.		RTI: Avoidance of synthetic fertilizers and pesticides was included and the data used comes from the Recycled Organics Unit (ROU), The University of New South Wales (2006): Life Cycle Inventory and Life Cycle Assessment for Windrow Composting Systems.	If future funding is allocated, conduct additional research.
4	Modern waste-to-energy facilities recover energy from waste more efficiently than those modeled in the report.		RTI: The amount of energy recovered is a function of the plant design, air pollution control and other parasitic loads, and the heat value on the waste input. Therefore it's hard to just say that they recover more energy without more detailed information. The waste-to-energy industry did not provide any response to our data questionnaire and thus average facility assumptions were used to come up with conservative estimates.	If future funding is allocated, conduct additional research.
5	Removal of long-term carbon sequestration from report and findings needs to be explained, perhaps quantified and included as an alternative baseline.		RTI: Some more justification can help. We typically like to show results with and without LF carbon storage to gauge its significance. It's technically correct to include it in an analysis such as this, and really comes down to a political/philosophical decision about whether or not to include.	
6	Report needs to be updated to reflect updated projections taking into account current recession.	16	RTI: Agree that actual vs. projected disposal amounts will not be perfect. The high level directional conclusions of the study should not change though.	If future funding is allocated, conduct sensitivity analysis regarding impact of changes in projections on findings.

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7	RTI MSW DST is cited as source for GHG information from Anaerobic Digestion. No information available at the MSW DST webpage on the RTI Anaerobic Digestion model.		RTI: The AD model is not part of the MSW DST. It was built originally for a City of LA study and has been refined over time. We can make documentation for it available as needed/requested.	Review Anaerobic Digestion model for additional research needs.
8	The total materials adjusted tonnage should state 35,983,478. This is a 50,000 ton upward adjustment of what is stated in table. Table headings could be more descriptive of data.	Table 1-2, page 19	RTI: I could not see the problem. The totals adjusted tonnage in Table 1-2 shows as 35,938,478.	Figures should be revised.
9	The list of final management alternatives does not include various types of compost and recycling.	Section 1.3, page 24-25	RTI: This is correct in that there are many different shapes and sizes of compost and recycling operations. We couldn't model them all so we modeled them as "typical" operations. For recycling there isn't much in the way of process GHGs so what we really care about is the percent materials that are recovered for recycling. For composting, you could get more variation in GHG emissions depending on the exact facility design and operation.	If future funding is allocated, conduct economic analysis of windrow composting & ASP composting; MRF recycling, C&D recycling and self-haul/bale recycling.
10	Minimum Energy Consumption scenario is not included in the tool. The reason for exclusion should be mentioned in report.	Section 1.4, page 25	RTI: The focus of the tool had always been stated as being on cost and GHGs. Energy can be a good metric and a good proxy for criteria air pollutants the greater the percent of fossil fuels in the electricity grid mix.	
11	Table 1-7, page 27 states that the study assumes the percentage of renewables in grid mix ramps up to 33% in 2020. Page 227 states that scenarios assume no change in electrical grid mix. Page 65 states the assumed future electricity grid mixes were established based on renewable and biomass energy legislation. Page 67 states a linear progression of renewable sources to 33% was assumed to 2020 and beyond to 2025.	Table 1-7, page 27	RTI: Need to make text consistent to explain that even though changes in the electricity grid mix are expected they were not captured in the modeling results, but evaluated in the sensitivity analysis, Section 6.2.2.	If future funding is allocated, capture changes in electricity grid mix in modeling.
12	Statement regarding the ability to modify assumptions in Tool should be clarified that changes can only be made when the "User Defined Region" is selected.	Section 1.4, page 27	RTI: Yes, this could/should be stated. We didn't want to give user the ability to modify regional assumptions to preserve the settings based on the project data gathered/developed. If they wanted to do that, they would need to use the "user defined" scenario.	
13	Was the revenue from producing a low carbon fuel at a landfill or Anaerobic Digestion facility incorporated?	Table 1.7, page 27	RWB: No. We did not specifically address low carbon fuel impacts in the economic analysis.	If future funding is allocated, capture revenues from low carbon fuel production.
14	No details on equipment or operational parameters that would vary between ASP & Windrow are provided. ASP may not need to run a windrow turner but what about the energy for the blowers?	section 2.1, page 32	RTI: The ASP and Windrow compost processes should be considered to be generic designs. The main difference between the ASP and Windrow designs is the energy consumption, with ASP not needing to run a windrow turner.	If future funding is allocated, identify significant equipment and/or operational parameters that vary between composting methods, including energy consumption.

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15	No discussion of how offsets or burdens are allocated between composting and recycling when feedstock is mixed MSW.	Section 2.1, page 32	RTI: In short, materials flow to recycling or composting depending on the scenario objective (e.g., min cost). Materials sent for recycling are recovered according to their separation efficiency and the subsequent burdens and offset accrue accordingly. Same for composting. Residuals (non-recyclable and non-compostables go to landfill or other feasible options such as waste-to-energy).	If future funding is allocated, provide expanded explanation of how offsets and burdens are allocated when feedstock is mixed MSW.
16	Statement that boundary excludes specific collection and transportation of source separated organic materials to chip and grind facilities contradicts Table 3-6, page 66 which states 10 mile distance for collection route to chip and grind facility.	Section 2.2, page 35	RTI: The LCI boundaries differ from the cost boundaries. The statement on boundaries excluding specific collection and transportation of source separated organic materials to chip and grind facilities refers to the cost boundaries.	
17	"LCA results for recycling systems are mainly governed by energy consumption, process emissions, and beneficial offsets from the product application."	Section 2.3, page 36	RTI: Text needs to be modified, it should refer to remanufacturing benefits.	If future funding is allocated, report revision needed.
18	Statement that small, medium, large, automated, labor intensive, C & D, & self haul/self bale were all targeted. Were all these MRF types modeled in the scenarios?	Section 2, page 37	RWB: 3 types of MRFs were modeled in the report - C&D, self bale and a multi-material MRF. The cost differentials between these 3 types of MRF were intended to capture differences mainly in automated versus labor intensive operations as well as variances in materials handled.	If future funding is allocated, report revision needed.
19	No description of types of anaerobic digestion facilities.	Section 2.4, page 37	none.	If future funding is allocated, conduct additional research to capture the GHG & economic differences of various types of anaerobic digestion facilities.
19.5	Not clear if GHG offsets for fuel production are considered although figure 2.5 lists fuel as an Anaerobic Digestion product.	Section 2.4, page 37	RTI: Only electricity offsets were estimated. Text needs to be modified to this effect.	If future funding is allocated, revise report to clearly delineate the boundaries of Anaerobic Digestion and include the GHG offsets for fuel production.
20	No discussion of when the dashed boxes come into consideration.	Section 2.4, Figure 2-5.	RTI: The dashed boxes just represent components of the system that are offsets/burdens outside of the direct waste mgmt system (e.g., recycling benefits that occur out of the country).	Clarify use of dashed boxes.
21	Section 2.4, page 38/39 should reference that gag offsets from soil carbon and avoided fertilizer come from attachment BC1.	Section 2.4, page 38-39	RTI: Yes, these aspects can cite the compost report.	Include reference.

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22	Report should include non-ferrous metals recovery at waste-to-energy facilities. Aluminum, brass, and copper are recovered at Covanta facility, resulting in an increased reduction of GHG emissions and an increase in energy savings.	P.41, throughout report	RTI: That would be fair to add. They never responded to the data/information questionnaire however. Consider results conservative for waste-to-energy as any new waste-to-energy would likely recover more than just ferrous.	If future funding is allocated, collect data on non-ferrous metal recovery for economic and GHG analyses.
23	No mention of how landfill system boundaries or assumptions vary between 4 types of landfills (vent, flare, electricity, fuel) modeled in scenarios.	Section 2.7, page 43	RTI: The boundaries are exactly the same in each landfill type. The only difference is how gas is managed and how that dictates any potential energy offset.	If future funding is allocated, revise report to clearly describe how assumptions change depending on how gas is managed.
24	Landfill disposal baseline scenario does not mention how landfill carbon storage is treated.	Section 2.7, page 44	RTI: I don't know the exact page(s) but I believe it's stated somewhere that it's not included and why.	
25	LNG & CNG are used interchangeably.	Section 2.7, page 44	RTI: It should be CNG.	If future funding is allocated, collect data to quantify the GHG and Economic variation between production of LNG or CNG.
26	Button next to select region is broken / unavailable.	Tool - main menu	RTI: I believe this comment may be referring to the "Year" dropdown list which should have been removed. Have now fixed this issue.	
27	Navigation out of unit emissions goes to wrong destinations and does not by default go back to main menu.	Tool - unit emissions1	RTI: I was unable to reproduce this problem in the latest version of the tool - all radio buttons within the main unit emissions page went to their corresponding unit emissions page when tested. The button on each specific unit emissions page states "Unit Emissions Menu" and returns to the main unit emissions page by design. The main unit emissions page enables the user to return to the main menu.	
28	Saving, opening, and closing the Tool takes a long time and the application can crash mid-session.	Tool	RTI: Retesting/revisiting the tool. This is partly due to the large amounts of data within the tool and may also be affected by the amount of memory on the user's machine or whether it is being run over a network connection.	
29	Electricity grid mix input from user is minimal compared to the underlying supporting spreadsheet.	Tool - Assumptions & Adjustments	RTI: The "hidden" sheets were not designed to be used by the user so we didn't spend a lot of time cleaning them up…thus there are gaps here and there and other formatting issues.	
30	Unit emission data pulls from multiple sources. Unclear as to how numbers were arrived at. Some have blank values.	Tool - Unit Emissions 1-45	RTI: There are particular combinations of waste items/processes that aren't feasible and thus the unit emissions show as being blank for those cases.	
31	Rounding along the stages has produced different results between the tool and the report. It also causes some variables to be insignificant due to certain values overpowering others.	Tool	RTI: Rounding causes this but also there were decisions/changes made in assumptions right up until the last minute of the project and those changes made it into the tool but not the report because we didn't have time to re-run and update everything.	If future funding is allocated, standardize results between Tool and Report.

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32	Third paragraph states that fabrication of capital equipment included. This contradicts statement on page 65, paragraph 5 that states fabrication of capital equipment is excluded. Inconsistent with information in Section 5.1.2, page 99.	Section 3.1, page 47	RWB: This is an RTI assumption. Capital costs were not broken out specifically by equipment. The estimates for capital costs were based on data gathered through the surveys and discussions with project team members relative to the anticipated level of annual capital expenditures for a particular process. RTI: The LCI boundaries differ from the cost boundaries. The statement on boundaries excluding fabrication of capital equipment refers to the LCI boundaries.	If future funding is allocated, clarify the boundaries for the LCA and the cost analysis.
33	Statement that carbon storage in landfills was included in LCA boundary and quantified is incorrect.	Section 3.1, page 48	RTI: Yes, this is incorrect. It was originally included and removed in the draft final version. We missed a reference to it here.	
34	More research needed regarding statement that no data is available for manufacturing in East Asia.	Section 3.1, page 48	RTI: We did some research on this for another project recently (Dec 2009 timeframe) and didn't come up with anything very useful. The Asian electricity grid mix has more coal than the US average grid mix and one could argue that the offsets may be greater because of this. However, the two pieces of information that aren't readily available are (1) how much of the material sent to Asia actually gets recycled vs. landfilled as contaminated material; and (2) how much cleaner or dirtier manufacturing facilities are in Asia vs. the US.	If future funding is allocated, conduct additional research.
35	Geographical boundary confusion: "Note that the geographic boundaries for the LCA and economic analysis portion of this project are different from the geographic boundaries of the GHG Tool."	Section 3.1.2, page 49	RTI: LCA boundaries are the globe. For the economic analysis, there's always the question of "cost to who" that must be considered. Therefore the economic/cost boundaries reflect the cost to manage the waste from collection to ultimate disposition. It doesn't include things like opportunity costs or dollar values for environmental pollution and/or pollution reduction.	If future funding is allocated, revise report to clarify geographic boundary description.
36	Reference to Local Government Protocol to justify time scale is inaccurate. Local Government Protocol does not include a 2025 date.	Section 3.1.3, Page 49	RTI: That can be fixed or reworded differently. The basic message here is that we were trying to be consistent with what the LGO Protocol assumptions, etc.	
37	Various approaches to GHG inventories is not discussed.	Section 3.1.4, page 50	RTI: Yes, this could be added. Flows refer to emissions and emission reductions/savings. Stock change refer to carbon storage (e.g., soil, forest).	
38	References to previous interim memos and that further work is ongoing are inaccurate.	Section 3.2, page 51	RTI: Yes, that could be clarified.	
39	Need to further disaggregate emission and energy factors. Also, need to state that for compost, 1/2 the IPCC values were used.	Table 3-1, page 52	RTI: We aimed to disaggregate factors as much as possible. It's difficult to respond without more detail about what the commenter was looking for.	
40	Footnote #2 states "For this version of the Report RTI used LF Flare for residuals disposal and it is planning to modify this assumption distributing the residuals among the different types of LF's according to the available capacity assumptions to be presented in Table 6".	Table 3-1, page 55, Footnote #2	RTI: Text needs to be modified to state that results were estimated assuming the residuals go to LF Flare.	If future funding is allocated, conduct sensitivity analysis around this assumption.

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41	Data source(s) for emission factor citations are not apparent. Emission factors for C&D recycling are incorrect. Emission factors for C&D recycling should be listed in the Multi-MRF recycling column. Information on page 58 appears correct. Table title should state that the emission factors are statewide. Footnote refers to Attachment X and should refer to RTI1-1 for regional values. Table 3-2 does not include values for LNG but RTI1 does include values for CNG. C&D Lumber values do not match RTI1 across the entire row.	Table 3-2, page 56	RTI: Table 3-2 needs to be fixed.	If future funding is allocated, revise report to correct Table 3-2
42	Sources of emission factors are not cited.	RTI-1	RTI: More detailed documentation on the emission and energy factors can be found under Attachment X.	If future funding is allocated, revise report to increase transparency of data in Attachment X.
43	Data source(s) for emission factors not cited. Table Title should say energy factors are for State. Columns for Landfill CNG/LNG are missing. Values for AD are given as 1.82E+06 while values in attachment X are listed as -4.60E+05 BTU/Ton. It appears values in C&D Recycling column should be in the Multi-MRF Column, with the exception of page 61. Values are provided in Table 3-3 for Green Material ADC but are missing from RTI1-2, and Attachment X.	Table 3-3, page 59	RTI: Table 3-3 needs to be fixed.	If future funding is allocated, correct Table 3-3
44	Statement that composting and anaerobic digestion of newsprint result in positive emissions is counterintuitive given the large offset value provided in Attachment X and the relatively small burden associated with transportation.	Section 3-2, Page 62	RTI: The main reason composting and AD of newsprint result in net positive GHG emissions is that the process GHG emissions from collection, transportation, compost/AD operations, and disposal of residuals is greater than the beneficial offsets achieved. For compost application, the benefits aren't very significant. For AD, you get energy offsets which are more significant as seen in the chart, just not enough to produce a net offset.	If future funding is allocated, revise report to provide additional discussion of findings including impact of emission control technologies for anaerobic digestion.
45	Assumed distances for transportation vary from distances used in Table 4.17, page 84-85.	Table 3-6, page 66	RTI: These should be made consistent. They were changed at the last minute to reflect comments and apparently we missed a spot to change them.	If future funding is allocated, revise report to standardize transportation distance assumptions in the report.
46	Table should be labeled 3-7, not 1-7.	Table 1-7, page 67	none.	Correct label on table.

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47	No discussion or analysis of impact from economic downturn.	Section 4	RWB: The assumptions used in the analyses were based on information we had at the time this report was being prepared. While we certainly recognized that the economy was in an economic downturn, since we were looking at such a long time horizon, we did not specifically focus efforts on trying to time the long term economic recovery. Rather we assumed a more normal level of economic activity for the long term. For example, in estimating revenues from recyclables, rather than take the current level of revenues that we were seeing in the market, we used a longer time horizon to estimate the level of revenues from recyclables. This was one example of how we took into account the economic downturn and adjusted our future projections for a return to more normal economic conditions.	If future funding is allocated, revise report to account for economic downturn in modeling.
48	Constraint that waste flow will remain in region of generation is not reflective of actual waste flow in California.	Section 4.1, Page 69	RWB: The project team recognized the limitations of this assumption. However, again due to the limited resources available, we were not able to determine in a diligent and defensible fashion how this assumption could be varied without undertaking a greater effort than was budgeted for. Therefore we had to simplify this assumption.	If future funding is allocated, collect additional data on actual flow of materials in California for use in subsequent analysis.
49	How do the economics vary for the 4 type of landfills, 2 types of composting, 3 types of recycling, and 2 types of Anaerobic Digestion?	Section 4.2, Page 70	RWB: The project team recognized that there were certain study assumptions that needed to be specifically tailored to the GHG and economic portions of the analysis. The various types of landfills had a significant impact on GHG estimates; however, in discussions with the project team it was determined that from a cost standpoint, operating and capital costs were not expected to vary to the point that it would materially impact landfill cost results. We also needed to balance the need for keeping the analysis within a reasonable range of complexity and this was factored in to the decision of how many levels of assumptions were used for the various processes. For composting, recycling and AD, we felt that there was enough differentiation in the costs that warranted separating out these processes. Costs differentiation assumptions were developed based on discussions with composting, MRF and AD operators and/or review of available data.	If future funding is allocated, revise report to provide additional discussion of the assumptions used in developing the economic analysis. Collect data on how landfill revenues are impacted by management of landfill gas for use in future analysis.
50	Discussion of use of input/output models needs clarification so the reader knows why these models were used in the report but not included in the GHG Tool.	Section 4.1, page 70	RWB: The goal of the input/output analyses was to determine the direct and indirect impacts of the various processes on the local regional economies that were the focus of this study. The analyses were meant to provide a snapshot of the direct and indirect impacts at a specific point in time, namely the base year of 2006. The analysis was not intended to project impacts as the IMPLAN model is not designed to handle changes to the key relationships used in the model such as local tax structures, buyer/seller relationships and technology.	If future funding is allocated, revise report to clarify the use of the input/output model and relationship to the study scenarios.

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51	Footnote references source that is not available.	Table 4-1, page 71	none	Include references.
52	Statement that Board has set a 70% diversion goal by 2020 is inaccurate.	Section 4.2.2, page 71	none	Clarify statement.
53	Footnote references an excel spreadsheet that is not available.	Table 4-2, page 72	none	Include references.
54	Table 4-3 contains similar but not identical information to what is in Table 1-6. Footnotes vary between tables. Tables should contain the same information.	Table 4-3, page 73	none	Correct discrepancy.
55	Reference to Scenario Analysis Memorandum should be removed and pertinent information from that Memorandum should be included here. No discussion of economic value derived from producing a low carbon fuel. Why were different methodologies used to project the price of carbon credits for Anaerobic Digestion and Composting?	Section 4.2.2, page 74	RWB: Two specific deliverables for this project were used as the foundation for the final assumptions and methodology. These deliverables contained detailed survey responses and a compilation of low, average and high costs based on the survey data and other sources. This data was the basis for the numbers used in the analyses. They are not identical to the final numbers used in the analyses since the values used have evolved through the review and vetting process. Those two deliverables are about 100 pages in total. It is recommended that these two deliverables be located in the same site as the final report. We did not focus on the economic value of low carbon fuel due to resource constraints. The different methodologies for projecting how carbon credits were applied to AD and composting were developed based on discussions with the project team and available data.	If future funding is allocated, collect data on economic value of low carbon fuel for use in future analysis. Revise report to include all relevant information from interim deliverables in report.
56	Statement regarding modifications that can be made in the Tool should be clarified that changes discussed can only be made in the "User Defined Region". Reference to Scenario Analysis Memorandum should be removed and pertinent information from that Memorandum should be included here.	Section 4.2.2, page 75	RTI: The comment is correct in regards to users only being able to change factors, etc. in the "user defined" scenario.	If future funding is allocated, revise report to include all relevant information from interim deliverables in report.
57	Description of types of MRFs contradicts what was stated on page 37 where the recycling system boundaries are described. What type of MRFs were modeled for the GHG and Economic analysis?	Table 4-4, page 76	RTI: Note that this was only done to come up with cost ranges for different types of MRFs. They aren't applicable to the LCA portion.	If future funding is allocated, revise report to describe types of MRFs actually modeled.
58	Content in table is also contained in Table 5.5 page 104	Table 4-8, page 78	None.	none
59	CPI for 2009 are now available.	Table 4-9, page 79	None.	none

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60	Collection cost information is not differentiated between solid waste and recyclables.	Section 4.2.3, page 80	RWB: In discussions with the project team it was decided that additional resources were not available to perform a more detailed study of collection costs and that available data and resources would be used to develop an estimate. We tried to focus the majority of our efforts on the processes themselves and identifying as much cost detail as possible.	If future funding is allocated, collect information on cost differential between collection of solid waste and recyclables for use in future analysis.
61	Was the regional wage price index used to adjust collection costs between the regions? How collection costs were determined should be described.	Table 4-11, page 81	RWB: The California Wage Index for Regions was used to reflect collection cost differences between the regions. See below for other report references. Final Report, page 102: The range of values for residential collection costs was $66/ton-$229/ton based on data from RWB Studies and 5 California specific data points . The middle of this range was selected to be used in the analysis, also taking into account some variations in reporting periods. Final Report, page 103: The data for commercial collection costs was not easily comparable. Typically, we expect commercial collection costs to be lower than residential collection costs and therefore we are estimating commercial collection to be approximately 80% of residential collection costs. Final Report, page 80: Collection cost per ton estimates were derived primarily from secondary research and the project team's experience in conducting solid waste cost of service studies. The $150/ton and $120/ton estimates for residential and commercial collection costs, respectively, are comparable to values in a study conducted by Goldman and Ogishi, 2001. The assumed split between residential and commercial collection is based on the 2004 CIWMB Waste Characterization Study.	If future funding is allocated, revise report to provide additional discussion on regional collection cost calculation methodology.
62	Unclear what information is conveyed in last sentence. It is not clear if CPI is relevant to Engineering News Record capitol costs in table 4-10.	Section 4.2.3, page 79	RWB: This is a typo - "CPI" should have read "ENR Construction Cost".	Correct typo
63	Discussion of how facility size assumptions affect the number of new facilities needed.	Table 4-12, page 82	RWB: Facility size assumptions were based on a combination of data received through the surveys and discussions with project team members. Resources were not available to conduct an extensive survey of the size of facilities in the regions/state.	If future funding is allocated, revise report to include discussion.
64	Footnote says that revenues and costs for ASP compost are 110% greater than for windrow composting. Need justification for why revenues for ASP compost would be greater than for windrow compost. What about publicly operated treatment works vs. stand-alone anaerobic digestion?	Table 4-13, page 82	This assumption was based on discussions with project team members. Since ASP is a relatively new technology, actual cost data was difficult to obtain. It was determined that additional energy costs would be the main differentiator and that difference could be on the order of 10% for operating costs which could then lead to potential revenue increases on that same order of magnitude. Cost differences for the two AD configurations were based on data collected and discussions with project team members.	If future funding is allocated, include additional discussion of costs and revenues for AD & composting.

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65	Interest rate of 5% for capitol costs does not reflect change to capitol markets from economic downturn.	Table 4-14, page 82	RWB: We felt this was a conservative assumption. We did not have the resources for this project to analyze a more exact interest rate; rather we based this on discussions with other Beck team members that were working on similar projects involving projections of capital costs and found that this was a reasonable assumptions.	
66	Product transportation distances in table 4-15 do not match product transportation distances that are included in the GHG Tool.	Table 4-15, page 83	none	If future funding is allocated, revise report to standardize transportation distances.
67	For anaerobic digestion, is it reasonable to assume a 63% reduction in weight of incoming feedstock, i.e. 17% product (digestate) + 20% residuals disposal for stand-alone and publicly operated treatment works AD operations?	Table 4-15 & Table 4-16	RTI: RTI Will have to revisit this data. Current data came from ARI (Alternative Resources, Inc.). 2007. Los Angeles County Conversion Technology Evaluation Report- Phase II an the response we got from the data collection survey.	If future funding is allocated, conduct additional research.
68	Description of how costs were calculated is absent. Reference to Scenario Analysis Memorandum should be removed and pertinent information from that Memorandum should be included here.	Table 4-18, page 4-86	RWB: See response to item 55 above.	
69	Issues with Notes: Should footnote #2 reference Table 3-7, not table 1?	Table 4-18, page 4-89	RWB: Note 2 should refer to Table 4-8, page 78.	If future funding is allocated, revise report to correct discrepancy.
70	Carbon Price projection should reference Table 6-6 & the RW Beck carbon price model.	pg. 4-90 Footnote 17	RWB: Yes, this would add further clarity.	Add references
71	Page 98-101 is identical to page 65 to 67	page 98-101	none	
72	Table 5.7 is nearly identical to Table 1.7 page 27. However, slight differences in language introduce some confusion for the reader as to how policies were incorporated into the Study. (e.g. AB32 and landfill gas).	Page 106/107	RTI: Table 5-7 could be improved by adding/modifying a column clarifying/making explicit how each of the policies were considered in both the LCI and the cost analysis.	If future funding is allocated, make revisions to report for clarity.
73	What assumptions were generated for composting? We know in study out years 50% is open windrow and 50% is ASP but how do the economics and GHG burdens vary between the two.	Table 5.7, page 107	RWB: See Table 4-13, page 82, footnote 1 for a breakdown of composting technology assumptions. Also, see Table 4-18, page 4-90, notes 16 and 17.	If future funding is allocated, revise report to include explanation and references.
74	Why are tonnages of excluded materials included in Table 5.1? Were material types that were excluded from the GHG analysis included in the economic analysis? Table 1.2, page 19 has adjusted tonnage for 2006 baseline. Table 1.1, page 16 is identical to Table 5.1	Table 5.1, page 99	RWB: The adjusted tonnage projections used in the economic analysis are shown in Table 4-1 on page 71 for the State. The base year 2006 tonnage data matches that shown on Table 1-2 on page 19.	If future funding is allocated, revise Table 5.1 to match Table 1.2
75	Asterisks are embedded in Table but no footnotes are provided.	Table 5.2, page 100	none	

Line	Staff/Stakeholder Observations	PAGE/ LOCATION	Contractor Response	Potential Work Needed (pending funding & resources)
75.5	Why is there a variation in residuals transportation for anaerobic digestion? AD residuals transportation distances contradict information provided in Table 4.17, page 84.	Table 5.2, page 100	RTI: Please refer to Table 16 of the April 14, 2009 – Interim Report, Scenario Analysis Design, Boundaries and Key Assumptions for the Life Cycle Assessment and Economic Analysis of Organic Waste Management and Greenhouse Gas Reduction Options, for documentation. Table 5-2 is in agreement with Table 16.	If future funding is allocated, include relevant information from interim deliverables in report.
76	Why are transportation distances to Asian and Mexican markets listed as n/a when distances are provided in Table 5.2, page 100? Footnote explains costs developed based on dollar per ton. Are costs from table 4-11 what were used for ocean shipping costs? Costs for shipping to foreign markets needs to be included in Table 4-17. Where is the dollar/ton figure for each material type provided?	Table 4-17, page 84	RWB: The footnote to Table 4-17 should indicate the transportation costs are on a $/mile basis. Transportation distances to the foreign markets and recycling transportation distances from the port to final plant are not shown as these costs are determined on a dollar per ton basis. Section 4 presents information on the economic analysis. The transportation costs are shown in Table 4-11 on page 81. This includes costs for shipping to foreign markets, which are based on a dollar per ton basis. In instances where distances are shown as not applicable, the costs are based on a dollar per ton basis as shown in Table 4-11 on page 81 rather than on a per mile basis.	Revise footnotes
77	Why was IMPLAN developed as a stand alone analysis? How does it relate to the rest of the study? What data from the LCA & economic analysis was used in the IMPLAN analysis?	Section 4.3.1, page 91	RWB: See response to item 50.	
78	It assumed that collection costs are the same for MSW and recyclables. Also assumed that commercial collection costs are 20% less than residential costs. Do listed transportation costs apply to all transportation legs? Comment introduces additional confusion to reader about where this cost was applied.	Table 5.4, page 102	RWB: Refer to Table 4-11, page 81 for a summary of transportation costs for all legs.	If future funding is allocated, revise report to clarify discussion of transportation costs
79	Projection of steep drop in price of electricity after 2008 warrants discussion.	Table 5.5, page 104	RWB: Recall that in 2008, oil prices hit record levels above $100/barrel. This was reflected in the price of energy in 2008. Projections for subsequent years did not assume the same level of oil prices. The projections in Table 5.5 were developed in the Spring of 2009.	If future funding is allocated, revise report to add discussion to report
80	Statement that tax credits were evaluated but no information is provided on conclusions of evaluation and how or if tax credits were applied.	Section 5.1.3, page 106	RWB: The only process that we were able to specifically identify tax credit revenues was for biomass to energy.	If future funding is allocated, add discussion to report and details on biomass tax credit revenues.

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81	For year 2015 we calculated costs and got different results than what is listed in table 5.9. Our total costs calculated out at $76,000 dollars greater or a 0.3% difference. Note should be provided regarding rounding, if this is the source of discrepancy. How was unit net processing income/cost determined for landfills? Does the unit net processing income vary for landfills that vent, flare or utilize LFG to Electricity or CNG? Does the landfill processing income vary by material type?	Table 5.9, page 111	RWB: Costs were rounded to the $1,000s. Information on the net processing income (cost) amounts are provided in Table 4-18 on page 4-86 and reported in the Scenarios report. Available data was limited and the unit net processing income (costs) does not vary by material type or various facility configurations.	If future funding is allocated, revise report to note use of rounding.
82	Statement that landfill revenues outpace inflation due to increases in energy prices of 5% per year. Is this reflected in unit net processing incomes listed in Table 5.9 page 111? Would expect slope of line in Figure 5.1 to decrease in out years if energy sales outstripping inflation had a significant impact which is not apparent in the graph.	Section 5.2.1 , page 119	RWB: The analysis includes all costs for the baseline scenario including collection and processing at the landfill. Collection costs are assumed the same for all processes. Netting the collection costs against the landfill net unit costs (which include revenues, operating and capital costs) results in increasing unit costs.	If future funding is allocated, clarify discussion in report.
83	Contradictory statements on the same page regarding inclusion and exclusion of biogenic carbon from study. Text description of Figure 5.3 does not match what is shown in Figure 5.3.	Section 5.2.3, page 120	RTI: Text needs to be fixed.	If future funding is allocated, revise report to explain how landfill carbon storage is treated in baseline and quantify landfill carbon storage. Also see Line 5 and Line 24 above.
84	Do revenues from anaerobic digestion biogas increase in a similar fashion as revenues from landfill gas which increase at 5%/year as stated on page 119?	Section 5.3.1, page 130	We did not assume a correlation between the two revenue streams.	If future funding is allocated, revise report to describe assumptions used for AD revenue streams.
85	Averaging costs for Anaerobic Digestion at publicly operated treatment works & stand-alone facilities is problematic since it prevents any material from going to anaerobic digestion in out years under the minimum cost scenario.	Table 5.14, page 131	During the course of this project we had to establish limitations on how best to represent the scenarios given the resources available. We recognize that having more than one type of configurations for each process would have been more accurate. However we simply did not have the resources to model to this higher level of complexity. We discussed these trade-offs within the project team and decided that this was the best approach given the resources available. The idea here is that we are showing the costs of what we assumed would be a more typical configuration of organics and recycling processes at a given point in time. It is not meant to capture all options as indicated above in response to item 49.	If future funding is allocated, collect data on AD costs for use in future analysis.

Line	Staff/Stakeholder Observations	PAGE/ LOCATION	Contractor Response	Potential Work Needed (pending funding & resources)
86	How are the costs to manage the percent of C & D lumber that is still landfilled (line 3) incorporated into the minimum cost calculation? Why are the annual capital costs (line 27) constant? Should these be escalated based on inflation? Line 46 - costs for transporting residuals was included; were costs of landfilling residuals included?	Table 5.13, page 129 similar comments apply to Table 5.20, page 152	RWB: Table 5.13 only shows a snapshot of the costs for the C&D under the chipping/grinding scenario as an example. The amount of C&D tonnage and resulting costs for the C&D lumber that is landfilled are shown in Tables 5.12 and 5.15 of the final report. These are based on the economic assumptions shown in Section 4 of the report. The annual capital financing is constant because these are levelized debt payments. The capital financing details are provided in Table 4-14 on page 82. Refer to Table 5.4 on page 102 about the landfilling costs.	If future funding is allocated, revise report to expand example calculation to include all costs.
87	When you multiply the cost/ton by the tonnage of a material type the results do not match what is in the table. Explanation of how rounding was done and impact should be provided.	Table 5.15, page 133	RWB: Example calculation for Table 5.15 on page 133, line 2: Minimum Cost Scenario - Leaves & Grass - Landfilled in 2006 $118 cost/ton (page 136) x 1,747,231 tons (Table 5.12, page 125) = $206,173,258/1000 = $206,173 which is rounded to $206, 170. The results are rounded to the nearest thousands.	If future funding is allocated, include discussion in report revision.
88	Table should be labeled 5.16	Table 5.15, page 136	none	If future funding is allocated, revise report to correct table title.
89	Table 5.17 is unchanged from the June Draft Report. Values should have changed to reflect removal of landfill carbon storage in the baseline. Figure 5.11 on page 144 shows GHG emissions decreasing between 2006 & 2010 which contradicts footnote for table 5.17.	Table 5.17, page141	none	If future funding is allocated, revise report to address discrepancies.
90	Statement that GHG sensitivity analysis of removing waste-to-energy prior to finalizing report is confusing as this is the final report. Sensitivity of removing waste-to-energy is not included in Section 6.	Section 5.4.1, page 162	RTI: Yes, we just ran out of time to do this and it should be removed from the text.	If future funding is allocated, conduct waste-to-energy sensitivity analysis.
91	Why are costs for recovering metals from an waste-to-energy facility greater than other material types? Are revenues from recycling metals from waste-to-energy facility attributed to the waste-to-energy facility?	Table 5.22, page 158,159	RWB: No revenues from metal sales were assumed for waste-to-energy due to lack of data. However costs were assumed to transport the metals to foreign markets which increases waste-to-energy costs.	Collect data for use in future analysis.
92	For minimum cost while achieving GHG targets why was just paper tonnage adjusted? Which RWB appendix (1-4) supports this scenario?	Section 5.5, page 165	RWB: This scenario should have been removed from the report since the minimum cost achieving GHG targets was the same as the minimum cost scenario.	If future funding is allocated, revise report to remove scenario.

Line	Staff/Stakeholder Observations	PAGE/ LOCATION	Contractor Response	Potential Work Needed (pending funding & resources)
93	Add justification for fraction of additional facilities needed from Section 6, page 220.	Table 5.29, Page 178	RWB: Results are shown in decimal format due to rounding issues. The total waste calculations for each alternative are easier to link to the facility size and cost assumptions if the additional number of facilities is shown in decimal format. If the decimals were removed, there could be significant swings in tonnage or costs if one were to check the calculations. The decimal format is used to remove this potential source of confusion.	If future funding is allocated, revise report to provide additional discussion.
94	Statement that GHG emissions increase from baseline to 2010 is contradicted by Figure 5.23 on page 179.	Table 5.28, Page 178	RTI: couldn't find this statement in the text. The Figure cited is for energy consumption and not GHG emissions. ???	If future funding is allocated, revise report to address discrepancy.
95	What scenario are direct values based on?	Section 5.7, page 201	RWB: The IMPLAN analysis was not based on any scenario. The data provided was for the base year 2006.	If future funding is allocated, revise report to provide additional discussion on purpose of Implan analysis.
96	Why was the lower end of the range for landfill staff size selected?	Table 5.36, page 205	RWB: This is an observation from the analysis. There were approximately 3,245 jobs at 149 landfills resulting in approximately 21.8 jobs on average.	If future funding is allocated, clarify text in report revision.
97	What scenario are the fiscal impacts calculated for?	Section 5.7.3, page 212	RWB: The IMPLAN analysis was not based on any scenario. The data provided was for the base year 2006.	If future funding is allocated, revise report to provide additional discussion on purpose of Implan analysis.
98	Statement that Implan analysis is valid through 2011. Is Implan analysis limited to the 2006 and 2010 study period? Is the implan for any particular scenario or some combination of base case and scenarios combined?	Section 5.7.4, page 217	RWB: The IMPLAN model is not designed to be used to project impacts into the future. It measures the direct and indirect impacts of industries on local economies at a given time. The assumptions incorporated into this model reflect technologies, tax policies and structures and buyer/seller relationships at a given point in time. All of these assumptions will change with time and that is why the results of the IMPLAN analyses are valid for just a short time period - through 2011. The IMPLAN model is a stand alone analysis as discussed above in item 50.	If future funding is allocated, add discussion to report revision.
99	Statement that Cost sensitivity analysis of removing waste-to-energy prior to finalizing report should be removed. Sensitivity of removing waste-to-energy is not included in section 6.	Section 6.1, page 218	RWB: This was planned but may not have been completed by RTI.	If future funding is allocated, conduct waste-to-energy sensitivity analysis.
100	Table 6-2 contradicts information provided in the following: Table 5.17, Table 5.23 and Table 5.32. No information is provided for minimum cost while achieving GHG targets scenario in Table 5.28, page 178	Table 6-2, page 221; Table 5.17, page 141; Table 5.23, page 162; Table 5.32, page 198	RWB: Tables 5.17, 5.23 and 5.32 were not properly updated. Updated tables are provided in the attached worksheet. The minimum cost while achieving GHG target scenario is the same as the minimum cost scenario. This was not properly updated in the report.	If future funding is allocated, update report.

Line	Staff/Stakeholder Observations	PAGE/ LOCATION	Contractor Response	Potential Work Needed (pending funding & resources)
101	Why does the energy consumption & GHG emissions in the baseline remain fairly constant while the tonnage of material landfilled increases by almost 20 million tons by 2025?	Figure 6.2, page 221 & Figure 6.3, page 223	RTI: This is likely due to the assumed increase in landfill gas-to-energy.	If future funding is allocated, revise report to explain.
102	Carbon credits are not provided for chip & grind or anaerobic digestion, yet in Section 2 where boundaries are discussed it mentions that carbon credits were included for chip & grind and anaerobic digestion. Table should be expanded to include landfill baseline.	Table 6-3, page 224	RWB: See Table 4-18, line 18 for estimate of carbon credits for AD. Estimates for chipping/grinding were not available.	If future funding is allocated, revise report Section 2.
103	What methodology was used to determine revenue from energy and gas sales for landfills.	Page 225	RWB: The projection of revenues from energy sales was based on a combination of actual data from landfill operators used as the base and the increase in projected energy market prices.	If future funding is allocated, revise report to include discussion of methodology in report.
104	What data limitations impact ability to characterize GHG emission from energy sources in CA?	Page 227	RTI: There's no limitation aside from the challenge of accurately predicting the future. We made some assumptions about the future grid mix and then did some sensitivity analysis around it.	If future funding is allocated, add clarification to report revision.
105	Statement that previous sections did not consider changes in CA electricity grid mix contradict Table 1-7, page 27 & Table 1-7, page 67. What grid mix was used for the scenarios in each study period?	Page 227	RTI: The grid mix FY 2006 was used. Need to make text consistent to explain that even though changes in the electricity grid mix are expected they were not captured in the modeling results, but evaluated in the sensitivity analysis, Section 6.2.2.	If future funding is allocated, revise report to make necessary revisions for consistency on electricity grid mix assumptions.
106	What landfill gas collection efficiency was used for each time period? Statement implies that 81% was used for all study time periods. Intent was start with 75% collection efficiency and ramp up to 81% collection efficiency in 2020 due to implementation of the Landfill Early Action Measure adopted by ARB.	Page 229	RTI: The same collection efficiency was used for all the study time periods. Need to make text consistent to explain that even though changes in the collection efficiency are expected they were not captured in the modeling results, but evaluated in the sensitivity analysis, Section 6.2.2.	If future funding is allocated, revise report to reflect 81% collection efficiency used for all study periods.
107	Not clear what year/scenario sensitivity analysis is conducted for.	Section 6	The sensitivity analysis was not conducted for a specific year. It is intended to evaluate the impact that changes in the specific parameters will have in the results for any year.	If future funding is allocated, provide clarification in report.
108	Description of different types of trucks used in determining GHG emissions are discussed. Was the economic analysis based on the same truck assumptions? How were the differential costs combined into a commercial and a residential cost number?	Page 232	RWB: A single cost for trucks was used in the economic analysis.	If future funding is allocated, revise report to add clarification.

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109	Largest impact from Low Carbon Fuel Standard is in recycling due to transportation to foreign markets. Should we assume that CA's Low Carbon Fuel Standard will affect carbon intensity of fuels used in foreign transportation?	Page 235	RTI: I guess this would depend on the origin of the freighters. If CA-based, they would presumably be under the Low Carbon Fuel Standard. If they are foreign, perhaps the Low Carbon Fuel Standard would not apply.	Monitor implementation of regulation to determine impact on foreign transportation emissions.
110	Additional discussion and results from sensitivity analysis needed. Should include results of sensitivity analysis for each scenario. The size of facilities is relevant to the costs.	Page 236 & 237	RWB: Unfortunately, there was not enough time to conduct more extensive sensitivity analyses.	If future funding is allocated, conduct more extensive sensitivity analysis.
111	LCA included 3 types if recycling, "MRF", "C&D", "Self-Haul." Table 1-6 only has "recycling"; Tool includes the 3 types.	Table 1-6 Page 26	RTI: Table 1-6 needs to be modified.	If future funding is allocated, revise report to address discrepancy.
112	LCA included 4 types of landfills "ER", "Flare", "Vent", "LNG." Table 5-8 only has "landfill"; Tool includes 4 types of landfills.	Table 5.8 Page 108-109	RTI: Table 5-8 needs to be modified.	If future funding is allocated, revise report to address discrepancy.
113	In Table 3-2 the recycling factors appear to be in the wrong column (glass factors are in C&D column and not MRF column).	Table 3-2 Page 56	RTI: Table 3-2 needs to be fixed.	If future funding is allocated, revise report to address discrepancy.
114	The South Central Valley Region's detail and summary reports in the Tool have "name errors".	Tool - detail & summary	RTI: Reproduced this problem and have now fixed this issue.	If future funding is allocated, revise Tool.
115	There is no agriculture crop residue tonnage in regions or statewide, only user-defined	Tool	RTI: The reported tonnage for that waste categories in the regions, state, and years of the study was 0. The user defined category will allow for different entries.	
116	There is no user's guide or developer's guide provided.	Tool	RTI: Correct, we tried to incorporate as much user guidance in the tool itself and to make it an open architecture so the Board could change cost/emission factors and other key assumptions as better data is made available.	If future funding is allocated, develop users guide for tool.
117	When selecting an option from the FAQ's tab in the Tool, it opens a blank page.	Tool	RTI: I wasn't able to reproduce this problem. The only thing I can think of is that the 5 FAQ documents provided with the tool were not located in the same folder as the tool. The FAQ documents must be in the same folder location as the tool in order to be opened automatically from within the tool.	
118	When changing the electricity grid mix, an error message appears every time a number is entered.	Tool - electricity grid mix	RTI: This is an Excel "feature" when validation is enabled on cells. Validation has been enabled on the electricity grid mix cells to ensure that the total is equal to 100% so that calculations will be correct. The error does not prevent users from enter a number into the cells.	
119	When selecting "User Defined Region" the default landfill methane capture efficiency is set to 100%, not 81% as with the other regions	Tool	RTI: Perhaps have it default to 75% per EPA AP-42.	If future funding is allocated, revise tool defaults for user defined region

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120	The Landfill process burden in the Unit Emissions is not defined.	Tool - unit emissions	RTI: Values and data sources were given (example Lumber's LF ER process burden is 0.0032 MTCO2e/ton and the data source is MSW DST). Is there more technical definition in interest?	If future funding is allocated, provide disaggregated Landfill process burden in Unit Emissions table.
121	In the Unit Emissions, the "Vehicle Type" column only states "Recyclables Collection" and the "Mode" is "Trucks", it does not state if they are Heavy-Duty or Light Duty diesel as described in the Report and Tool.	Tool - unit emissions	RTI: They are all heavy-duty diesel.	If future funding is allocated, revise Tool to provide consistency with report.
122	In the Unit Emissions, the "Vehicle Type" column only states "Collection - Mixed Waste Collection" and the "Mode" is "Trucks", it does state if they are heavy -duty or light duty diesel as described in the Report and Tool	Tool - unit emissions	RTI: They are all heavy-duty diesel.	If future funding is allocated, revise Tool to address discrepancy and provide consistency with report.
123	In the Unit Emissions, the South Central Valley column does not have any emissions listed	Tool - unit emissions	RTI: SCV region values were missing and have now been included.	
124	In the Unit Emissions selection, the "Source" is mostly "RTI's MSW DST", we are unable to gain access to this source	Tool - unit emissions	RTI: All of the data and methods employed in the MSW DST are contained in documentation that a link was provided for.	If future funding is allocated, revise report to provide reference to specific documents/page numbers within the MSW DST .
125	With the Statewide option, the mileage distances cannot be changed in the general assumptions	Tool - general assumptions	RTI: The statewide assumptions are not changeable by the user. The user must use "user defined" scenario. RTI: This is correct.	The user must be in the "User Defined" scenario in order to change assumptions.
126	With the Statewide option, none of the economic assumptions can be changed. Report gives reader impression that Tool will allow assumptions to be modified. This should be clarified to reflect modifications allowable in the User Defined Tool Scenario.	Tool - economic assumptions	RWB: The user must be in the "User Defined" scenario in order to change assumptions. The statewide options are not changeable. The "User Defined" scenario is populated with the statewide option and these numbers can be changed. RTI: When a user selects "User Defined" as the region to model, all assumptions will default to the statewide assumptions but the user must enter their own waste projections and tonnage allocations. If these match the statewide waste projections and tonnage allocations (this can be achieved with copy and paste) then the user can change the assumptions to see different statewide scenarios.	The user must be in the "User Defined" scenario in order to change assumptions.
127	The option:"Exclude the IPCC non-energy process emission factors from the following processes?" is a confusing double negative.	Tool - emission assumptions	none	If future funding is allocated, revise Tool.
128	statewide option - cannot change ANY "key process characteristics"	Tool	RTI: The statewide assumptions are not changeable by the user. The user must use "user defined" scenario. RTI: Please also see RTI's response in line 126.	The user must be in the "User Defined" scenario in order to change assumptions.

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129	SCV emission factors for anaerobic digestion are very different than other regions.	Tool - unit emissions	RTI: Not sure what the error appears to be. We'll check in the tool and see if we can provide a better reply.	Possibly because SCV emission factors were not included - see line 123.
130	In the Statewide option, none of the defaults in "Assumptions - Net Costs" can be changed	Tool - Assumptions - Net Costs	RTI: The statewide assumptions are not changeable by the user. The user must use "user defined" scenario. RTI: Please also see RTI's response in line 126.	The user must be in the "User Defined" scenario in order to change assumptions.
131	There are many blank pages when following arrows through the Tool	Tool	RTI: The blank pages separate the different sections of the tool, i.e. Assumptions, Waste Projections, Tonnage Allocation, Detail Reports, and Summary Reports. This is by design.	If future funding is allocated, develop programmers guide.
132	The Net Cost reports only include "compost" and "landfill"; not 2 types of composting and 4 types of landfills as in the Report and Tool for GHG's	Tool	RWB: See response to item 49 above.	
133	When recreating the scenarios described in the report using the tool, the gag emissions are considerably different. The costs are within a small percentage range.	Tool	RTI: RTI is retesting/revisiting the data/tool	If future funding is allocated, revise Report and/or Tool to generate consistent GHG results.
134	Attachment BC-1: Changes in soil properties as a result of compost or mulch application: Results of On-Farm Sampling has not been revised per the comments received.	Tool	RTI: Sally or Matt could best respond to this.	If future funding is allocated, revise Attachment BC-1.
135	Include table with complete data set for each of the 10 field sampling sites included in the report.	BC-1	RTI: Sally or Matt could best respond to this.	If future funding is allocated, revise Attachment BC-1.
136	Modern waste-to-energy facilities 700 kWh or more per ton of MSW, report assumes 570kWh/ton What are the decay constants used for waste components, commonly referred to as Lo?	Covanta	RTI: Please refer to Table 16 of the April 14, 2009 – Interim Report, Scenario Analysis Design, Boundaries and Key Assumptions for the Life Cycle Assessment and Economic Analysis of Organic Waste Management and Greenhouse Gas Reduction Options, for documentation.	If future funding is allocated, revise report to include waste-to-energy heat rate.
137	Waste-to-energy emissions cited possibly do not apply to California. The report and tool should use N20 emission factor of 9.6 x 10-4 MTCE/ton, which is in line with facility test results.	Covanta	RTI: That's fine however they didn't provide any data per our original data questionnaire or numerous follow up calls/emails. One could consider the waste-to-energy to be conservative in light of their comment.	If future funding is allocated, conduct additional research.
138	Report does not appear to investigate the impact of increased recycling rates on the relative quality of the materials recovered. Report also does not appear to evaluate the impact of this change in quality on GHG emissions and energy savings.	Covanta	RTI: Their premise is that trying to recover the last margins of recyclable material results in obtaining material that is contaminated/poor quality and therefore not actually recycled. It may be a valid point but we certainly don't have any data to cite or support this claim.	If future funding is allocated, conduct additional research.

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140	Concerns that some assumptions for "where waste could go for processing" do not appear to be technically viable. For example, in one scenario, nearly 100% of the material going to compost is food waste, with a small remainder being manure. This feedstock is not feasible for composting. Are there model constraints limiting the moisture content and minimum calorific content of the waste-to-energy feedstock to within viable ranges?	Table 4.3 page 73		If future funding is allocated, conduct additional research. This was identified as an area for future research in the executive summary.
141	Fats, Oils, and Greases (FOGs) are not considered as part of this analysis. FOGs play a significant role in making AD more profitable by increasing energy generation at a lower cost.	Report	These feedstocks were outside the scope of work.	If future funding is allocated, conduct additional research.
142	The interim reports give a value of 3.5 gal/ton diesel requirement. This seems high, explain and justify calculated diesel fuel use.	Report		If future funding is allocated, conduct additional research
143	Fails to reference the conversion technology life cycle and market analyses prepared by RTI and the National Renewable Energy Laboratory for the Board in 2004. Also no mention of the UC Riverside 2006 report: "Evaluation of Environmental Impacts of Thermochemical Conversion Technologies Using MSW Feedstocks" and UC Riverside 2009 report: "Evaluation of Emissions from Thermal Conversion Technologies Processing MSW and Biomass"	Report	Conversion Technologies were not part of the Scope of Work.	If future funding is allocated, conduct additional research.
144	It is not clear if the Report accounts for the type of fuel used in the trucks and barges for Export of Recyclable Materials to Foreign Markets.	Report		If future funding is allocated, pull data from Attachment X and include in Section 3 or more prominently reference Attachment X in Section 3.
145	The report assumes all recycling is closed-loop. Many materials are recycled in an open-loop process and the impacts of this difference should be considered.	Report		If future funding is allocated, conduct additional research.
146	Report did not address the following: surface and ground water pollution, wildlife impacts, litter, noise pollution, odor, discharges to public wastewater treatment facilities, or criteria air pollutant emissions.	Report		If future funding is allocated, conduct additional analysis